

## Claims

Having described the invention, the following is claimed:

- 1           1.       A surface acoustic wave device including a transducer electrode  
2       formed on a substrate, the electrode having a plurality of layers, and at least one of the  
3       layers being metal and another of the layers being a material for providing a hardening  
4       effect to the metal layer.
- 1           2.       A surface acoustic wave device as set forth in claim 1, wherein the  
2       material is a metal and oxygen compound.
- 1           3.       A surface acoustic wave device as set forth in claim 2, wherein the  
2       metal and oxygen compound includes aluminum.
- 1           4.       A surface acoustic wave device as set forth in claim 3, wherein the  
2       metal and oxygen compound is aluminum oxide.
- 1           5.       A surface acoustic wave device as set forth in claim 1, wherein the  
2       metal of the material includes aluminum.
- 1           6.       A surface acoustic wave device as set forth in claim 1, wherein the  
2       substrate is planar, each of the layers having a portion extending parallel to the  
3       substrate, the parallel extending portions being vertically stacked relative to the  
4       substrate, at least some of the layers also having portions extending transversely to the  
5       substrate, and the transverse extending portions being laterally stacked relative to the  
6       substrate.
- 1           7.       A surface acoustic wave device as set forth in claim 6, wherein the  
2       second layer, of hardening material, has a portion extending laterally about the first  
3       layer, of metal, for preventing migration of the metal.

1           8.     A surface acoustic wave device as set forth in claim 6, wherein the  
2 transverse portions do not extend onto the substrate beyond the electrode.

1           9.     A surface acoustic wave devices as set forth in claim 6, wherein the  
2 material is a metal and oxygen compound.

1           10.    A surface acoustic wave device as set forth in claim 9, wherein the  
2 metal and oxygen compound includes aluminum.

1           11.    A surface acoustic wave device as set forth in claim 10, wherein the  
2 metal and oxygen compound is aluminum oxide.

1           12.    A surface acoustic wave device as set forth in claim 6, wherein the  
2 metal of the material includes aluminum.

1           13.    A surface acoustic wave device as set forth in claim 1, wherein the  
2 transducer electrode is electrically connected to a metal component that permits  
3 electrical connection of the surface acoustic wave device to an electrical device  
4 external to the surface acoustic wave device, the electrode having a metal portion of a  
5 first metallization, and the component being of a second, different metallization.

1           14.    A surface acoustic wave device as set forth in claim 13, wherein the  
2 component includes a one of a bus bar and a bond pad.

1           15.    A surface acoustic wave device as set forth in claim 13, wherein the  
2 first metallization includes the metal portion of the electrode being made of a first  
3 metal, and the second metallization includes the component being made of a second,  
4 different metal.

1           16.     A surface acoustic wave device as set forth in claim 13, wherein the  
2     first metallization includes the metal portion of the electrode having a first thickness,  
3     and the second metallization includes the component having a second, different  
4     thickness.

1           17.     A surface acoustic wave device including a transducer electrode  
2     formed on a substrate, the electrode having a plurality of layers, and at least one of the  
3     layers being metal and another of the layers being a metal and oxygen compound.

1           18.     A surface acoustic wave device as set forth in claim 17, wherein the  
2     metal and oxygen compound includes aluminum.

1           19.     A surface acoustic wave device as set forth in claim 18, wherein the  
2     metal and oxygen compound is aluminum oxide.

1           20.     A method of making a surface acoustic wave device, the method  
2     including the steps of:  
3                 providing a substrate; and  
4                 creating a transducer electrode having a plurality of layers on the  
5     substrate, including creating a metal layer and creating a layer of a material that  
6     provides a hardening effect to the metal layer.

1           21.     A method of making a surface acoustic wave device as set forth in  
2     claim 20, wherein the step of creating a layer of a material includes creating the layer  
3     of material as a metal and oxygen compound layer.

1           22.     A method of making a surface acoustic wave device as set forth in  
2     claim 20, wherein the step of creating a transducer electrode includes metal lift-off  
3     processing.

1           23.     A surface acoustic wave device including a transducer electrode  
2     electrically connected to a metal component that permits electrical connection of the  
3     surface acoustic wave device to an electrical device external to the surface acoustic  
4     wave device, the electrode having a metal portion of a first metallization, and the  
5     component being of a second, different metallization.

1           24.     A surface acoustic wave device as set forth in claim 23, wherein the  
2     component includes one of a bus bar and a bond pad.

1           25.     A surface acoustic wave device as set forth in claim 23, wherein the  
2     first metallization includes the metal portion of the electrode being made of a first  
3     metal, and the second metallization includes the component being made of a second,  
4     different metal.

1           26.     A surface acoustic wave device as set forth in claim 23, wherein the  
2     first metallization includes the metal portion of the electrode having a first thickness,  
3     and the second metallization includes the component having a second, different  
4     thickness.

Sub 57 1           27.     A surface acoustic wave device as set forth in claim 23, wherein the  
2     electrode has a plurality of layers, and at least one of one of the layers being metal and  
3     another of the layers being a material for providing a hardening effect to the metal  
4     layer.

1           28.     A surface acoustic wave device as set forth in claim 27, wherein the  
2     material is a metal and oxygen compound.

1           29.     A surface acoustic wave device as set forth in claim 28, wherein the  
2     metal and oxygen compound includes aluminum.

1           30.     A surface acoustic wave device as set forth in claim 29, wherein the  
2 metal and oxygen compound is aluminum oxide.

1           31.     A surface acoustic wave device as set forth in claim 27, wherein the  
2 metal of the material includes aluminum.

1           32.     A surface acoustic wave device as set forth in claim 27, wherein the  
2 substrate is planar, each of the layers having a portion extending parallel to the  
3 substrate, the parallel extending portions being vertically stacked relative to the  
4 substrate, at least some of the layers also having portions extending transverse to the  
5 substrate, and the transverse extending portions being laterally stacked relative to the  
6 substrate.

1           33.     A surface acoustic wave device as set forth in claim 32, wherein the  
2 second layer, of hardening material, has a portion extending laterally about the first  
3 layer, of metal, for preventing migration of the metal.

1           34.     A surface acoustic wave device as set forth in claim 32, wherein the  
2 transverse portions do not extend onto the substrate beyond the electrode.

1           35.     A surface acoustic wave device as set forth in claim 32, wherein the  
2 material is a metal and oxygen compound.

1           36.     A surface acoustic wave device as set forth in claim 35, wherein the  
2 metal and oxygen compound includes aluminum.

1           37.     A surface acoustic wave device as set forth in claim 36, wherein the  
2 metal and oxygen compound is aluminum oxide.

1           38.     A surface acoustic wave device as set forth in claim 32, wherein the  
2 metal of the material includes aluminum.

1           39.     A surface acoustic wave device including a transducer electrode  
2 electrically connected to a component that permits electrical connection of the surface  
3 acoustic wave device to an electrical device external to the surface acoustic wave  
4 device, the electrode having a metal portion made of a first metal, and the component  
5 being made of a second, different metal.

1           40.     A surface acoustic wave device including a transducer electrode  
2 electrically connected to a component that permits electrical connection of the surface  
3 acoustic wave device to an electrical device external to the surface acoustic wave  
4 device, the electrode having a metal portion of a first thickness, and the component  
5 being metal of a second, different thickness.

1           41.     A method of making a surface acoustic wave device, the method  
2 including the steps of:  
3                   making a transducer electrode, including making the electrode to have  
4 a metal portion of a first metallization; and  
5                   making a metal component, electrically connected to the electrode, that  
6 permits electrical connection of the surface acoustic wave device to an electrical  
7 device external to the surface acoustic wave device, including making the component  
8 of a second, different metallization.

1           42.     A method of making a surface acoustic wave device as set forth in  
2 claim 41, wherein the steps of making a transducer electrode and making a metal  
3 component include metal lift-off processing.